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## 17. ON THE BREEDING BEHAVIOUR OF *SCHIZOTHORAX NIGER* HACKEL IN DAL LAKE<sup>1</sup>

(With a text-figure and a photograph)

### INTRODUCTION

The fishes of sub-family schizothoracinae of Dal lake are known to perform spawning migration and lay eggs on the bottom of snowed streams (Rampal 1967; Jan and Dass 1971; Sunder *et al.* 1977 and CIFRI Bull. 1977) that empty into the lake. During spring of 1977 spawning grounds of *Schizothorax niger* were located for the first time in the Dal lake itself, differing thus in breeding habits from other members of the sub-family. The eggs were located in the shallower regions of the lake around Bhatmazar (behind Engineering College), Gurtupora, Lathkadal on the south-east of lake and Sonalank in the Harzatbal-Saidakadal region (Fig. 1). Eggs were also collected in the shallow areas of Pishpow nal-

lah (Shalimar region) on the north-west of the lake. In Harzatbal-Saidakadal region the eggs were found attached to the submerged adventitious roots of willow (*Salix* spp) trees, while in the Shalimar region they were found scattered in clutches along the lake bed close to springs. The fertilized eggs ranged in diameter between 2.6-3.5 mm. The physico-chemical characteristics of the Harzatbal-Saidakadal and Shalimar-Thaksar regions of the lake are given below in Table 1.

The percentage of fertilization as determined by acetic acid method ranged between 75 to 84. Quantitative assessment of eggs attached to willow roots could not be made while number of eggs laid on lake bed ranged from 400 to 460 m<sup>2</sup>, only 50 per cent of eggs were found viable. The spawning period was ob-

TABLE 1

SOME RELEVANT PHYSICO-CHEMICAL CHARACTERISTICS OF DAL LAKE

Parameter	Hazratbal-Saidakadal region	Shalimar-Thaksar region
Water depth	20-35 cm	26-36 cm
Water temperature	17-20°C	15.5-17°C
Turbidity	13-16 cm	nil
pH	7.2-7.3	6.6-6.8
Dissolved oxygen	9.2-9.6 ppm	9.8-12.6 ppm
Free carbon dioxide	1.2-1.8 ppm	6.8-10.4 ppm
Total alkalinity	86-95 ppm	26-58 ppm

seved to last for about two months from 1st week of March to end of April.

To find out the incubation period, the eggs collected from the lake were transported to laboratory and kept in enamel trays under various treatments. The results of experiments are given below in Table 2.

prominant nuptial tubercles on the snout and coupled with it the roughness of body in males. The roughness of body and tubercles become evident just before spawning season starts and disappears shortly after spawning.

On March 20, 1977 an attempt was made to strip artificially *S. niger* collected from the lake. The eggs were stripped into enamel trays and the milt from male mixed. This operation was done at the lake site and the fertilized eggs transported to laboratory for rearing purposes (Photo. 1). The brood fish were in 260-310 g in weight range and 310-409 mm in length range. Number of eggs per kg of body weight were in the range of 15,100-17,200. The fertilization in artificially stripped eggs was 95%. These eggs were kept in enamel trays for rearing under three different sets of experiments and the results are given below in Table 3. The early fry were produced within 10-15 days.

TABLE 2

RESULTS OF EXPERIMENTS ON INCUBATION PERIOD OF EGGS COLLECTED FROM NATURE

Treatment	Temperature (°C)	No. of eggs/set	No. of hatchlings	No. of days taken for hatching	Percentage survival
a) <i>Still water</i>					
i. only water	13-17	50	21	5-13	42
ii. with sand & pebbles	13-17	50	22	5-13	44
iii. with lake mud	13-17	50	12	4-15	24
b) <i>Flowing water</i>	9.8-11.5	50	2	18-22	4

During the breeding season, the sexes can be easily distinguished by the soft, enlarged and distended belly in the females and presence of

RESULTS AND CONCLUSIONS

For the first time spawning grounds of *Schizothorax niger* have been located in the lake itself. The study reveals that immediately after winter when the lake temperature touches 14-18°C, *S. niger* breeds in certain pockets of the lake. The absence of spawning

<sup>1</sup>The Abstract of the paper was presented at the 65th Session of Indian Science Congress held at Ahmedabad, January 1978.

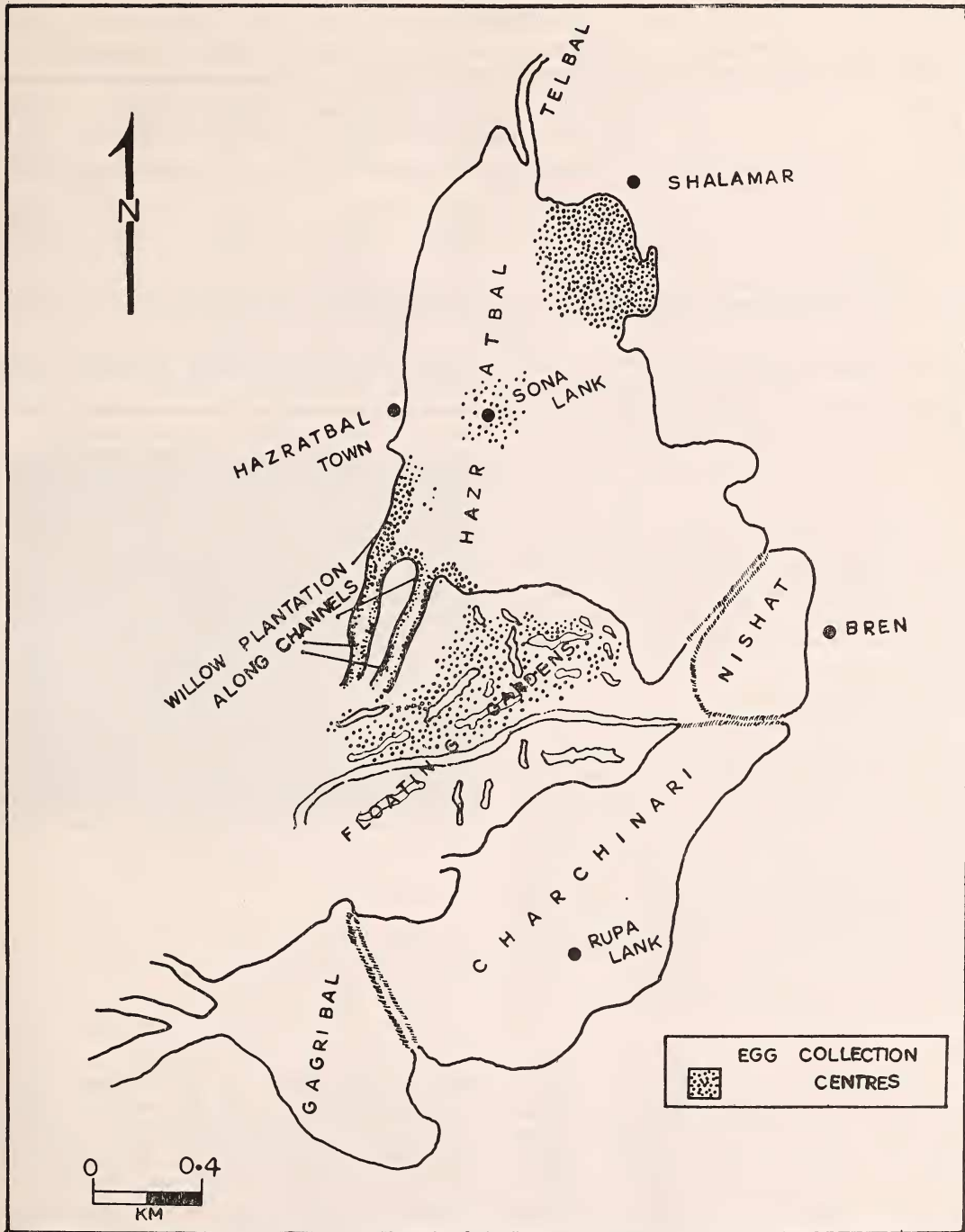


Fig. 1. Egg collection centres in the Dal Lake.

TABLE 3

RESULTS OF REARING EXPERIMENTS OF ARTIFICIALLY STRIPPED EGGS UNDER DIFFERENT TREATMENTS

Treatment	Temperature (°C)	No. of eggs/set	Hatching days from eggs to larvae	Absorption of yolk sac in days	Percentage survival	Total no. of days
a) <i>Still water</i>						
i. inside Lab.	13-16	250	7-9	5-7	85.5	14
ii. outside Lab.	13-23	250	4-5	5-6	85.5	10
b) <i>Flowing water</i>						
i. Outside Lab.	9-11	100	29-35	6-11	20	40

TABLE 4

THE SALIENT CHARACTERISTICS OF THE EGGS COLLECTED FROM THE LAKE AND THOSE ARTIFICIALLY STRIPPED. BOTH REARED UNDER LABORATORY CONDITIONS

Eggs stripped from <i>S. niger</i> and reared in Laboratory	Eggs of <i>S. niger</i> collected from Dal lake and reared in Laboratory
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**a. Eggs**

Fertilized eggs are spherical, translucent, demersal adhesive. They are creamy-yellow in colour. Eggs swell within fifteen minutes after extrusion and fertilization. Size ranges between 2.5-3.5 mm. The egg membrane is tough and smooth on the outside. The perivitelline space between the vitelline membrane and yolk is absent.

**b. Newly hatched larvae**

The yolk sac of the newly hatched larvae is half of the body length. The mouth is not apparent. It possesses a continuous fin-fold along the dorsal edge running behind the head to around the tail. Size of larva ranged between 7.0-8.0 mm. Melanophores are present on the body. Normally for the first 10-15 minutes after hatching the larvae just flick their tail along the bottom of tray. They progressively get more powerful and start to swim off, swimming upwards. When swimming ceases they become motionless and turn upside down with the head pointing downwards and steadily sink to bottom.

**c. Fry**

The yolk diminishes completely. The size of swim-up fry range between 9-10 mm.: Mouth is well developed. More melanophores have appeared along the ventral and dorsal surface. But more numerous on the head region of the body. The pectoral and caudal fins are well developed. The fry of 15-16 mm size has well formed body of fins.

Fertilized eggs are spherical, translucent, demersal adhesive and creamy yellow in colour. Size ranges between 2.5-3.6 mm. The egg membrane is smooth and tough. The perivitelline space is absent. tough. The perivitelline space is absent.

The larvae is 7.2-8.0 mm in size. Yolk sac is half the length of the body. It is devoid of mouth. The larval fin-fold is continuous and around the caudal end. Melanophores are present. It swims like the larvae produced from artificially stripped eggs.

The yolk is completely absorbed. The size of swim-up fry ranges between 9-10 mm. Pectoral and caudal fins are well developed. Mouth is developed with distinct alimentary canal. Melanophores are present and abundant on the head region of the fry. The fry of 15-16 mm size has well developed body and morphologically similar to the fry produced from artificially stripped eggs.



beds in the Gagribal and Charchinari area of the lake may be ascribed to topographic unsuitability especially lack of sheltered shallow areas. If lake water attains optimum temperature early due to favourable meteorological conditions the fish may breed early (as in the year 1977 when fish started breeding in first week of March); otherwise the breeding may be delayed by a month or so. The water chemistry of the spawning grounds does not give any clear indication that the fish prefers any special chemical spectrum to breed. The water chemistry of these grounds is similar to the other parts of the lake.

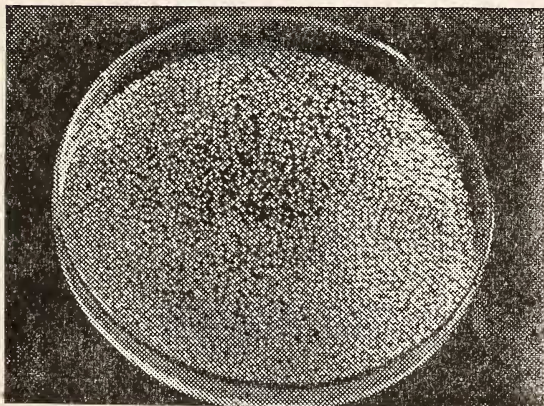


Photo 1. Artificially fertilised eggs of *Schizothorax niger*.

To confirm the species, apart from experimental fishing in and around the spawning grounds, the eggs collected from nature and those artificially stripped were reared under laboratory conditions and the developmental stages noted (Table 4). Similar developmental features were observed in both the sets.

The hatching experiments with eggs collected from nature clearly indicate that the survival was more (42 and 44%) if the eggs are kept in still water with or without sand and

pebbles, it was 24% in mud and only 4% in flowing water conditions (Table 2). The most encouraging aspect of the species is that it can easily be stripped. It takes about 14 days from egg to early fry stage at 13-16°C, with increase in temperature (13-23°C) the incubation period was lowered to 10 days (Table 3). In flowing water, the incubation period was observed to be very long, more than 40 days. Survival rate in case of artificially stripped under flowing water was also low (less than 20%) compared to 85% in still water (Table 3). This feature indirectly indicates that lentic water is more suited for breeding and early development. The preference of fish for lake breeding under the circumstances is self evident. These experiments give adequate indication that for *S. niger* running water is not essential for breeding and early development.

The present observations showing that the spawning habitat of *S. niger* lies within the Dal lake, constitutes an important finding and has immediate relevance in the revival of the declining fishery. The present investigation provides adequate basis for management measures like closed season and closed areas. The studies further indicate that the fish is amenable for artificial propagation as reflected by successful stripping and rearing experiments. This advantage can be utilized for raising stocking material to strengthen both the lake stock as well as for culture purposes.

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COLD WATER FISHERIES  
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18. A NOTE ON THE ZOOGEOGRAPHY OF INDIAN MELOIDAE (COLEOPTERA)

The information regarding the Meloidae (Coleoptera: Heteromera) of India though at the moment is incomplete in many ways, the available data does show considerable evidence on the Zoogeographical affinities of the

blister beetles.

Blister beetles are represented at present by 105 species belonging to 19 genera. Table 1 shows that the meloids exhibit a high degree of endemism. About 66.6 per cent species are

TABLE 1  
 ZOOGEOGRAPHICAL ANALYSIS OF MELOIDAE FROM INDIA

Sub-families and tribes	Total genera	number species	Endemic species	Oriental species	Palaeartic species	Ethiopian species	Australian species	Nearctic and Neotropical species	Wide spread species
Meloidinae									
Eleticini	1	4	2	1	—	1	—	—	—
Epicautini	3	34	24	10	2	—	—	—	—
Mylabrini	3	21	11	7	3	2	—	—	—
Lyttini	5	25	17	7	1	—	—	—	—
Meloini	1	4	2	—	2	—	—	—	—
Zonitinae									
Zonitini	4	14	14	—	—	—	—	—	—
Horiinae									
Horiini	1	2	—	2	—	—	—	—	—
Cissitini	1	1	—	1	—	—	—	—	—
Total	19	105	70 66.66%	28 26.66%	8 7.61	3 2.85%	—	—	—